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10/020,568	12/06/2001	Doron Orenstien	42390P10915	8585

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EXAMINER

SUAREZ, FELIX E

ART UNIT,

PAPER NUMBER

2857

DATE MAILED: 08/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/020,568

Applicant(s)

ORENSTIEN ET AL.

Examiner

Felix E Suarez

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 December 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-15 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6, 7, 9, 11, 16, 19-22, 26, 29-31, 35 and 36 is/are rejected.
- 7) ☒ Claim(s) 5, 8, 10, 17, 18, 23-25, 27, 28, 32-34 and 37 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35

U.S.C. 102 that form the basis for the rejections under this section made in this

Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

1. Claims 1-4, 6, 7, 9, 11, 16, 20, 26, 29 and 35 are rejected under 35

U.S.C. 102(e) as being unpatentable over Fernandez et al. (U.S. Patent

Application Publication No. 2001/0022615).

With respect to claim 1, Fernandez et al. (hereafter Fernandez) teaches an apparatus comprising:

a plurality of processing units (see page 2, paragraph [0016]);

a monitor to obtain a plurality of monitor values from said plurality of processing units, wherein said monitor is to transfer a process from a first

processing unit of said plurality of processing units to a second processing unit of said plurality of processing units (see page 1, paragraph [0012]) in response to said plurality of monitor values (see page 6, paragraph [0062]).

With respect to claim 2, Fernandez further teaches said monitor is to transfer the process from plurality of monitor values being greater than a second one of said plurality of monitor values over a period of time (see page 7, paragraph [0073]).

With respect to claim 3, Fernandez further teaches said monitor obtains a monitor value by at least one of the set consisting of:

- receiving a temperature indicator (see page 2, paragraph [0024]);

- estimating an activity level (see page 2, paragraph [0024]);

- receiving a power consumption estimate (see page 8, paragraph [0085] and page 11, paragraph [0121]).

With respect to claim 4, Fernandez further teaches each of said plurality of processing units is one of a set consisting of:

- a core of a multi-core processor (see page 5, paragraph [0049]);

- an execution unit of a processor (see page 2, paragraph [0016] and page 3, paragraph [0031]);

- a separate processor unit (see 2, paragraph [0016]).

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With respect to claim 6, Fernandez further teaches said monitor comprises:

an exchange module to exchange processes between ones of said plurality of processing units (see page 2, paragraph [0019] and FIG. 1).

With respect to claim 7, Fernandez further teaches said monitor comprises:

a move module to move one process from one of said plurality of processing units to another one of said plurality of processing units that is idle (see page 3, paragraph [0032]).

With respect to claim 9, Fernandez further teaches comprising:

a cache coupled to said plurality of processing units, wherein said monitor is to swap processes between said first processing unit and said second processing unit by saving a first plurality of state variables from said first processing unit in said cache and saving a second plurality of state variables from said second processing unit in said cache and restoring said second plurality of state variables to said first processing unit from said cache and restoring said first plurality of state variables to said second processing unit from said cache (see page 2, paragraph [0016]).

With respect to claim 11, Fernandez et al. (hereafter Fernandez) teaches all the features of the claimed invention, except that Fernandez does not teach said first processing unit and said second processing unit are coupled to receive power from different power wells and are capable of being independently operated at different voltages and frequencies under control of the monitor (see page 11, paragraph [0121]).

With respect to claim 16, Fernandez teaches a system comprising:
a plurality of processing units, each processing unit to track its power consumption, and to support a process move procedure (see page 3, paragraph [0032]);

a monitor to receive monitor information from each of said plurality of processing units and to re-allocate processes to different ones of said plurality of processing units in response to the monitor information received from the plurality of processing units (see page 1, paragraph [0012] and page 3, paragraph [0028]);

a memory coupled to said plurality of processing units to store instructions for execution by said plurality of processing units (see page 2, paragraph [0016] and page 3, paragraph [0034]).

With respect to claims 20, 29 and 35, Fernandez teaches a method (or machine readable medium) comprising:

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monitoring power (see page 11, paragraph [0121]) consumption of a plurality of processing units (see page 8, paragraph [0088]);

swapping processes between said plurality of processing units in response to monitoring power consumption of said plurality of processing units (see page 2, paragraph [0019]).

With respect to claim 26, Simar teaches an apparatus comprising:

a plurality of processing units (see page 2, paragraph [0016]);

a module to periodically transfer processes from a first processing unit from said plurality of processing units to a second processing unit from said plurality of processing units (see page 2, paragraph [0022]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 19, 21, 22, 30, 31 and 36 are rejected under 35

U.S.C. 103(a) as being unpatentable over Fernandez et al. (U.S. Patent

Application Publication No. 2001/0022615) in view of Simar, Jr. et al. (U.S.

Patent No. 6,182,203).

With respect to claim 19, Fernandez further teaches said monitor comprises:

an exchange module to exchange processes between ones of said plurality of processing units (see page 2, paragraph [0019]);

a move module to move one process from one of said plurality of processing units to another one of said plurality of processing units that is idle (see page 3, paragraph [0032]).

Fernandez does not teach:

a sum module to throttle processing of one or more of said plurality of processing units if a sum total of power consumption of said plurality of processing units exceeds a selected total power consumption metric; nor

a shutdown module to shut down one or more of said plurality of processing units in a low power mode.

But Simar teaches the features of the Digital Signal Processor (DSP) includes an advanced very long instruction word (VLIW) CPU with eight functional units including two multipliers and six arithmetic units.

Includes an instruction packing to reduce code size, program fetches, and power consumption (see Simar, col. 86, lines 26-45).

Simar also teaches in a Power-Down Modes, if the power-down mode state is terminated by an enable interrupt, the DSP will enter the interrupt service

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routine on wake-up and then return to the instruction after the power-down instruction (see Simar, col. 84, lines 4-13).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Fernandez to include the features of the DSP as taught by Simar, because ones of the features of the DSP is to process arithmetic functions and the interrupt service routine in the power-down mode.

With respect to claims 21, 30 and 36, Fernandez teaches all the features of the claimed invention, except that Fernandez does not teach,

exchanging processor state data via a cache memory.

But Simar teaches that the very long instruction word (VLIW) processing flow begins when a 256-bit wide instruction fetch packet (IFP's) is fetched from the internal program memory (that can also be configured as cache) (see Simar, col. 34, lines 36-65).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Fernandez to include the flow instruction fetch packet as taught by Simar, because the flow instruction fetch packet can also be configured as cache.

With respect to claims 22 and 31, Fernandez teaches all the features of the claimed invention, except that Fernandez does not teach,

moving a process from a first one of said plurality of processing units to an idle one of said plurality of processing units in response to monitoring power consumption of said plurality of processing units.

But Simar teaches 3 Power-Down Modes; Idle1 Mode- Idle3 Mode (see Simar, col. 84, lines 14-33).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Fernandez to include the Power-Down Modes as taught by Simar, because the Power-Down Modes includes Idle modes, as desired.

Allowable Subject Matter

3. Claims 5, 8, 10, 17, 18, 23-25, 27, 28, 32-34 and 37, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. Claims 12-15 are allowable.

5. The following is a statement of reasons for the indication of allowable subject matter:

Claims 12-15 are allowable because the prior art, particularly Fernandez et al. (U.S. Patent Application Publication No. 2001/0022615), Simar, Jr. et al.

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[U.S. Patent No. 6,182,203] (hereafter Simar) fails to teach or suggest an apparatus comprising:

monitor to monitor temperature and/or power consumption of said first core and said second core, and, in response to a selected metric being reached by one of said first core and said second core, to trigger storage of said plurality of first core state variables and said plurality of second core state variables in said cache and restoring of said plurality of second core state variables to said first core and restoring of said plurality of first core state variables to said second core.

Conclusion

Prior Art

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Senyk [U.S. Patent No 6,363,490] describes a processor having a processing core integrated with a temperature sensing diode.

Mishigaki [U.S. Patent No 6,463,396] describes a one-chip controller capable to recognize a change in temperature in a chip.

Nizar et al. [U.S. Patent No 6,470,238] describes a control device temperature.

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Thomas et al. [U.S. Patent No 6,487,668] describes a power management for a computer device.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Felix Suarez, whose telephone number is (703) 308-4926. The examiner can normally be reached on weekdays from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc Hoff can be reached on (703) 308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

July 23, 2003

F.S.


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